

**State of U.S.
CCSP/EOS/CERES/NPP/NPOESS/NRC
Decadal Study/A-train/ASIC³**

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**6th CERES-II Science Team Meeting
Oct 25-27, 2006
UKMO, Exeter, UK**



U. S. Climate Change Science Plan (CCSP)

- CCSP Observation Working Group (OWG) held a June 14/15 retreat on climate observation requirements.
 - Short term plan is based on community assessment of impact vs feasibility similar to ocean observing system approach.
 - Long term approach is climate model based climate OSSEs
- Multi-agency workshop on ways to achieve satellite climate calibration goals to be held May 16-18, 2006 in DC. Follow-on to 2002 workshop (Ohring et al., BAMS Sept 2005).
- Recent Global Climate Observing System (GCOS) draft document on satellite climate data record requirements out for review/comments by June 12, 2006. Partially based on Ohring et al., 2005 report, and extends to additional variables



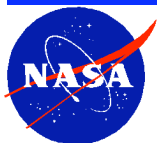
IPCC Assessment Report 4

- Cloud feedback remains the largest uncertainty in climate sensitivity and low clouds dominate the uncertainty. Feedback that changes planetary albedo.
- Aerosol indirect effect remains largest uncertainty in anthropogenic radiative forcing (changing albedo).
- Decadal changes in cloud/radiation now included in Chapter 3, including ocean heat storage/net radiation consistency.
- Expanded discussion of climate prediction uncertainties including early perturbed physics ensembles.
- Low and High sensitivity climate models show similar global mean temperature increases next several decades: large separations after 2050. Implies we need methods to resolve cloud feedback well before then to constrain climate sensitivity.
- Forcing $0.6 \text{ Wm}^{-2}/\text{decade}$: 25% cloud feedback $0.15 \text{ Wm}^{-2}/\text{decade}$ in cloud radiative forcing: *0.3%/decade in SW channel gain.*



NASA Earth Science

- NASA Administrator is Michael Griffin
 - Mary Cleave is AA for Science, Mike Freilich new chief Earth Science
 - Bryant Cramer is deputy for Earth Science Division
 - Don Anderson is Modeling lead, Hal Maring is Radiation Sciences
 - NRC Earth Science Decadal Study continuing and final report scheduled for ~ Jan/Feb 2007. NASA committed to this guidance.
- FY06 and beyond budgets expected to be nearly flat without inflationary increases for earth or space science
 - manned space flight costs have increased
 - lots of problems in earth & space science caused by this: removes about \$3B over the next several years from science.
 - Not clear when next ESSP competition will be
- NASA/NOAA Research to Operations: agreed on importance of extending some NASA missions to climate record continuity.
- Recent joint NASA/NOAA white paper on how to recover from recent deletion of climate instruments by NPOESS rescope to deal with being overbudget and behind schedule.



CERES Program

- Terra and Aqua will be writing new Senior Review proposals to extend missions in spring, 2007.
- Overall CERES funding moderately decreasing each year as algorithms and data processing mature.
- Appears that the full cost accounting issues are ok for the next few years.
- NASA HQ Program Scientist remains Don Anderson (here at the meeting).
- NASA Energy and Water System (NEWS) science group
 - global water and energy data sets, including A-train: subsets of CERES, MODIS, CALIPSO, Cloudsat along the lidar/radar ground track (64km swath)
 - Recent ocean cooling claim: net radiation, GRACE, altimeter,ARGO



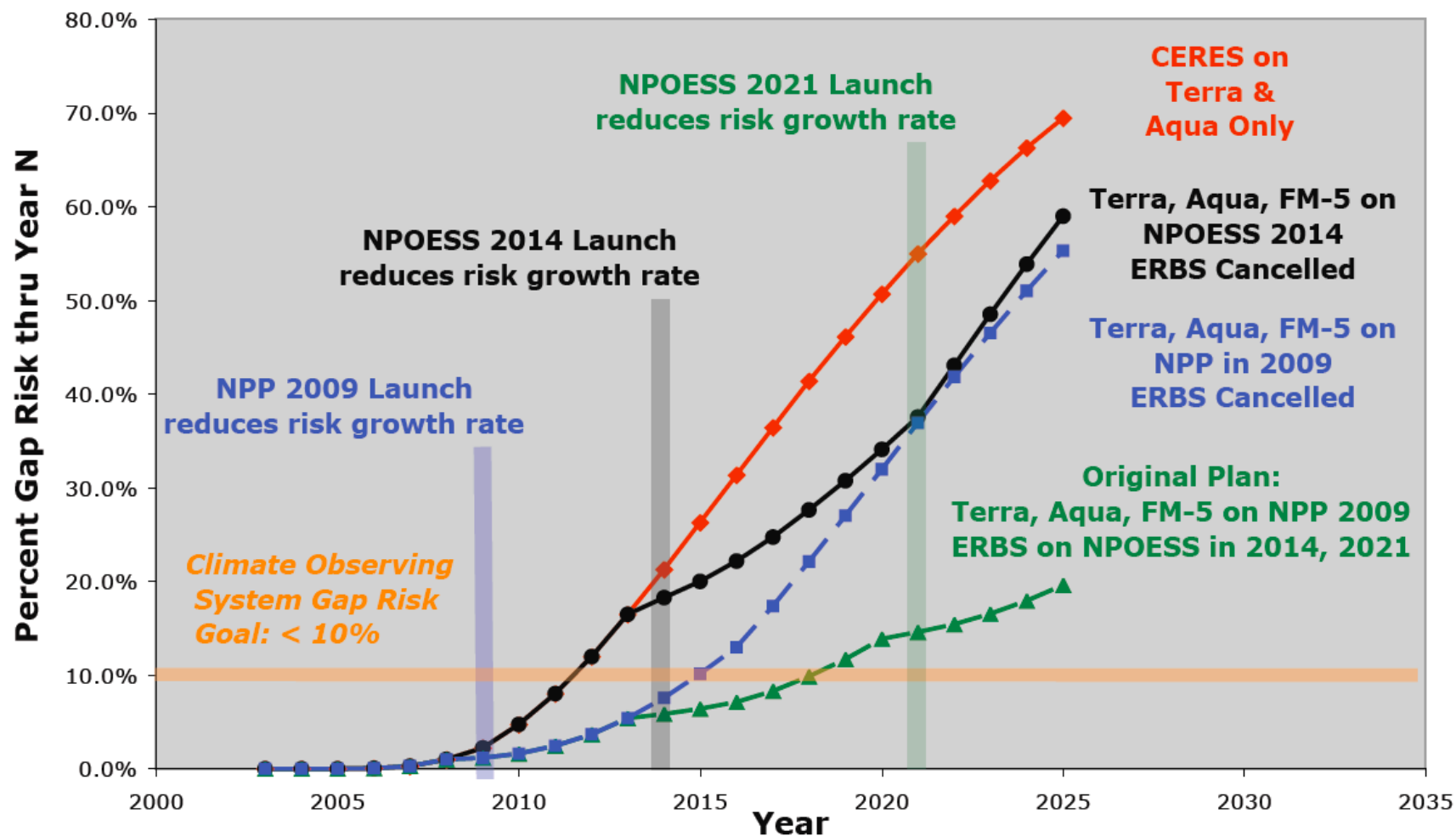
NPP and NPOESS

- NPOESS had planned CERES FM-5 instrument on first NPOESS 1:30 orbit launch in 2010, and then ERBS copies in 2015 and beyond.
- NPOESS seriously over budget and behind schedule: triggered Nunn-McCurdy review in U.S. congress completed June 2006.
 - Major problems are with VIIRS imager and CMIS microwave imager/sounder
 - Dropped all climate instruments: radiation budget, solar constant, altimeter, etc.
 - Dropped CMIS, VIIRS likely will make it: now through vibration&thermal vac tests
 - Not clear if NPOESS will be able to meet any climate requirements given budget/schedule problems, and given weather data is critical priority (not climate)
 - NPOESS still proposes to fly CERES FM-5 last copy on C1 platform, but now delayed to ~ 2014.
 - Gap risk now exceeds 10% climate goal (BAMS 2005, Ohring et al).
 - Discussions with engineering staff indicate little knowledge or analysis of reliability of spacecraft and instruments past 7 year lifetimes. 2 CERES Terra instruments now 6.5 years old, 2 Aqua instruments 4.5 years old: FM-4 has lost SW channel.
 - Gap risk to 2014 too large: recommend moving CERES FM-5 to NPP mission for launch in 2010 with VIIRS(MODIS-like imager) and CrIS (interferometer).



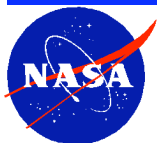
Radiation Budget Gap Risk: Satellite Scenarios

Past and Current Scenarios for NPP, NPOESS



NPP and NPOESS

- Given concern on losing climate instruments, the U.S. Office Science and Technology Programs (OSTP) requested NASA and NOAA to produce a white paper on how to deal with the NPOESS climate instrument deletion
- NASA white paper submitted August 2006: recommended moving CERES FM-5 up to flight on NPP mission in 2010, build of copies to add to NPOESS platforms in 2014 and 2019. Fly with VIIRS imager for CERES-like data products
- NASA/NOAA reviewed the draft white paper in Sept/Oct and recently agreed with original radiation budget recommendations and soon to be submitted to OSTP, OMB.
- Other recommendations included elimination of likely gaps in solar constant, altimetry for sea-level, ozone vertical profiles...
- NOAA and NASA budgets do not currently include such funding, and remains to be seen how this is dealt with. Some indications likely in next 3 to 6 months
- To get CERES FM-5 ready for launch on NPP in late 2009, need to start work by May 2007.
- NRC Decadal Study will also make recommendations relative to NPOESS redesign in Jan/Feb 2007.

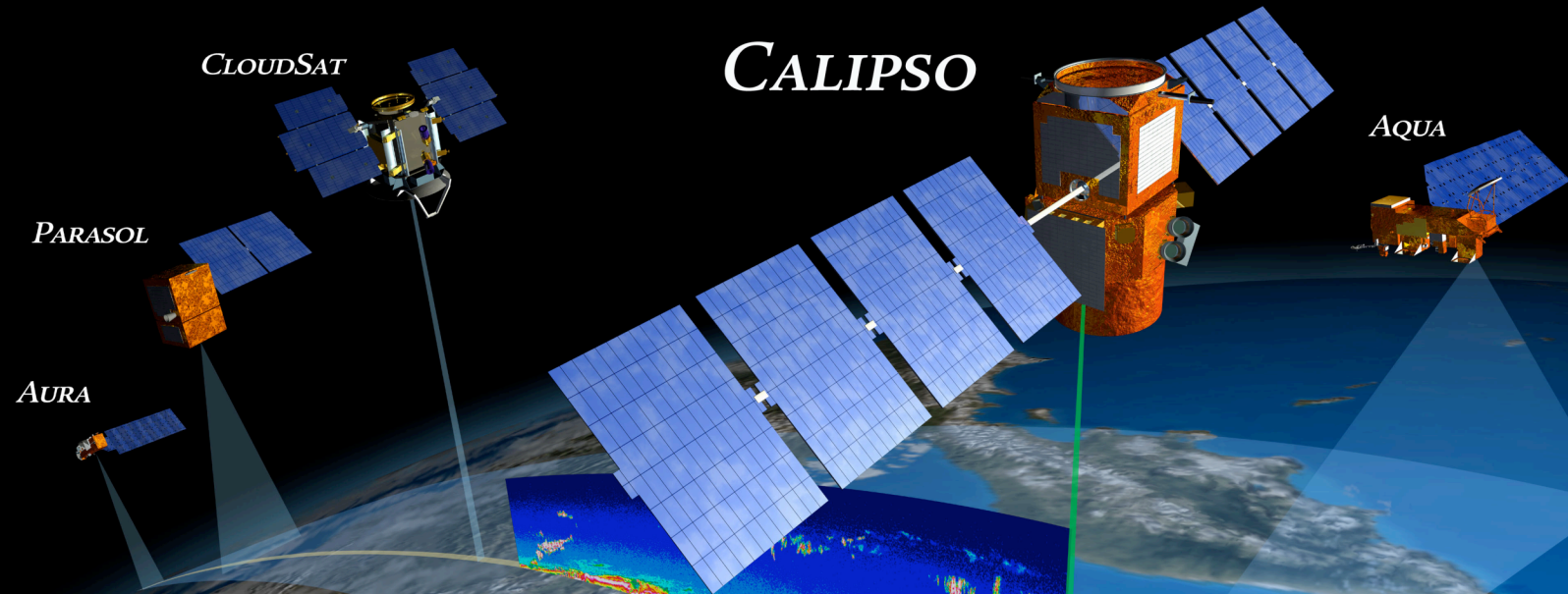


NASA/NOAA Research to Operations

- Congressional bill requires annual report starting Feb 2007 on:
 - progress in transitioning NASA research development to NOAA operations
 - progress in using NOAA operational data in NASA research
- Joint Agency Working Group panel includes (not a complete list):
 - NOAA: Chet Koblinski (climate lead), Louis Uccellini (NCEP), Tom Karl (NCDC)
 - NASA: Jack Kaye (R&A HQ lead), Michelle Reinecker (NSIP, GMAO), Jim Gleason (NPP project lead), Bruce Wielicki (CERES, CCSP Obs W.G.)
- Meeting in January, initial plan for report development, and 5 categories of RTO activities:
 - Follow on missions, Mission Extensions, CDR development/stewardship, Data Utilization, Tools and Standards
- Broader Meeting in April 24-26, U.Md. Conf Center
 - Review all earth science disciplines, lessons learned, challenges, opportunities
 - Radiation: RTO failed for ERBE, getting ready to fail for CERES
 - Weather prediction: 2/3 of progress in computers/physics 1/3 in data assimilated
 - Climate: NPOESS may default, record gaps critical, no OSSEs to prioritize
 - Overall: EOS has shown major advances possible, new active/passive technologies ready to advance, but not the resources to take advantage of either.



Cloudsat and CALIPSO have LAUNCHED!!!



CALIPSO

Probing Earth's atmosphere to unravel the mysteries of climate change.

CERES is working with CALIPSO and CloudSat to provide the science community CERES data subset along the lidar/radar ground track (NASA NEWS program)

